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BUILDING A GAS PIPELINE THROUGH THE ARCTIC

What About the Birds?

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Birds of the Western Arctic

In winter the far north is truly a land which deserves its reputation of harshness and hostility. The sun never rises. Temperatures plummet to 40; 50; 60° F below zero for weeks on end. Snow drifts over the tundra and sifts through the stunted spruces of the boreal forest covering the frozen plants, the ice-locked lakes and rivers. Life seems to have deserted the land. But here and there the silence is broken by the raven's harsh croak, the flutter of a snow white ptarmigan as a flock moves from willow to willow methodically nipping off the buds, or the chirping of flocks of redpolls among the spruces. Occasionally a gyrfalcon sweeps over the colorless landscape hunting ptarmigan or snowshoe hares. Only these four and perhaps less than a dozen others among the scores of bird species which visit the Arctic to nest in the warm summers, remain in the cold and darkness. Special adaptations, such as the ptarmigan's habit of sleeping in the relative warmth under the snow or the raven's ability to reduce circulation to its bare legs, allow them to remain. But why other species have not adapted to remain under these same conditions we do not know.

As light returns to the land some migrants begin to arrive even before the thaw. Snow buntings, sparrows, longspurs and other small birds are seen foraging for seeds in windblown areas. Majestic eagles arrive and join the ravens scavenging at caribou carcasses. Even the lives of the birds which have wintered there begin to change. The ptarmigan leave the willow patches of the lower delta and the small creeks in the Richardson Mountains where they have wintered and disperse over the tundra. And in early April though the temperature may still be 20 below zero the gyrfalcon chooses nesting sites on cliff ledges in the mountains and along the still-frozen rivers.

But the spring thaw looses the flood of feathered migrants.

The most important corridor for bird migration to the western Arctic is the Mackenzie River Valley, particularly the section between Norman Wells and Arctic Red River. Here in mid-May tens of thousands of snow geese, whistling swans, ducks, cranes and shore birds from many areas of North America are funnelled together before dispersing widely to their specific habitats and nesting grounds throughout the Arctic. Open water and snow-free areas are scarce when the birds first arrive so they congregate in dense flocks. Low-lying islands, vegetated with willows and poplar, and bordered by broad muddy shorelines where snow melt and open water occur earliest, are favoured concentration spots. Birds also concentrate in open water at the mouths of fast-flowing tributary streams, and in water pockets formed on the ice from melted snow and water forced up through holes in the river ice. The birds may remain here up to two weeks, feeding on horsetail roots and willow catkins; pairing and copulating in preparation for the short northern nesting season.

Other birds such as eiders and oldsquaw ducks, sea birds and some shore birds travel around the northern tip of Alaska and then eastward along the Beaufort Sea coast following leads in the sea ice. These birds, like the Mackenzie Valley migrants, push spring very hard in their drive to reach the nesting grounds as early as possible. Some waterfowl including the snow geese are on the nests before the snow has left the ground.

The western Arctic and sub-Arctic provide a great variety of nesting habitats including wet and dry tundra, coniferous and deciduous forests, beaches, deltas, vast flats of lakes and ponds, mountains and river cliffs. It is not surprising therefore that almost one half of the breeding bird species of Canada nest in this area, and many species breed nowhere else. The area provides the last undisturbed nesting areas for such rare and spectacular species as the peregrine falcon, golden eagle, eskimo curlew, and trumpeter swan. It produces over one-quarter of the world's whistling swans, millions of ducks, and 150,000 lesser snow geese each year. Let us consider some of the important areas for birds.

The golden eagle which has grown rare in southern North America nests commonly in the foothills near the caribou calving grounds on the arctic coast, and throughout the Richardson Mountains. These birds feed on ground squirrels and carrion from dead caribou and may occasionally kill a newborn caribou calf. The same mountains, deeply cut by streams, also provide nest sites on cliff ledges for gryfalcons, peregrine falcons, rough-legged hawks and ravens.

Several of the largest and most productive of the northern wetlands lie along or near the proposed pipeline routes. These include the Old Crow Flats of the northern Yukon, the Mackenzie River Delta and the Ramparts River Flats in the Northwest Territories, and others. These areas produce millions of waterfowl, shorebirds and cranes each year but are specially important in years when drought strikes the prairies. When low water conditions render the prairie potholes unsuitable for ducks they flock to these arctic and sub-arctic wetlands where the more stable water levels allow them to survive and breed. The arctic waterfowl population is more than doubled during years of severe drought further south.

The northwestern Mackenzie Delta and the small lakes of the coastal tundra provide vital nesting habitat for the whistling swan. This area is the single most important nesting area for this species in North America. In particularly good areas every lake will be graced by a stately swan incubating her eggs atop a massive sedgy nest. A few pairs of rare trumpeter swans also use this habitat.

The coastal tundra supports a variety of shorebird species including such uncommon species as the eskimo curlew, buff-breasted sandpiper, hudsonian godwit, whimbrel, and stilt sandpiper. Snowy and short-eared owls, loons, gulls, three species of jaegers, ptarmigan and a multitude of small passerine bird species are also part of the roster of nesters on the tundra, the most diverse of the nesting habitats.

As the season progresses another habitat becomes important — the molting areas provided by the sandspits, barrier beaches, coastal lagoons and islands of the Yukon and northeast Alaska coast. In late July and August tens of thousands of ducks and sea birds move to these sheltered locations to shed and regrow their feathers. The spits and islands also provide nesting habitat for colonies of gulls, terns, and eiders. These coastal habitats, along with the traditional cliff nesting sites of raptorial birds, are the most restricted and scarce of bird habitats.

Summer ends in August. The sun still shines 18 hours a day but it has lost its warmth. Frost colors the dwarf birches, bearberry and willows to bright scarlets and gold of fall tundra. Now, forced by snow, flocks of thousands of snow geese begin to appear on the foothill tundra of the northern Yukon. Soon almost the entire western Arctic snow goose population is gathered here — some 200,000 birds. Ahead of them lies a journey of thousands of miles to the wintering grounds, a journey which will require the concentrated energy of their stored fat. But the birds are thin. So short is the Arctic summer that the snow geese built their nests on the tundra before the snow had left the ground. In the brief weeks of warmth, when the sun shone 24 hours a day, the young developed quickly in a race to fledge before the first blizzards of autumn. The summer's food was sufficient for the geese to incubate and care for their young, and for the young to grow, but not sufficient to provide any excess energy to be stored as fat. The geese now have as little as two weeks left to put on fat which may mean the difference between death and successful fall flight.

They do it by gorging on the heavy crops of cranberries, crowberries and blueberries growing on the low shrubs of the tundra. These geese cover the hills in flocks so vast that at times they appear to be the first dusting of autumn snow.

With the first blizzards, the migrants leave. Once again the Mackenzie River Valley becomes a geographical funnel concentrating birds from thousands of square miles of tundra, coast, and forest. Unlike the spring migration, during which birds stop to wait for the thaw to progress northward, the fall migration is often non-stop. The snow geese for example fly directly from the Mackenzie Delta to the Hay Lakes in northern Alberta (another area near the proposed pipeline routes).

But if we could follow each species leaving the western arctic we would see its importance to not only the birds of Canada and the United States but to half the globe. The whistling swans winter on Chesapeake Bay, the jaegers scatter throughout the open oceans of the world.

The arctic tern, the most ambitous of all the world migrants, goes to the opposite end of the earth — the Antarctic.

By the final freeze up of the Mackenzie, the Arctic is once again left to the ptarmigan, the raven and the gryfalcon. Another cycle is complete.

Summary of Possible Conflicts Between Pipeline and Bird Population

The main areas where pipeline construction and associated activities may come into conflict with birds are as follows:

- Disturbance of migrant waterfowl by aircraft or construction activities at concentration points during spring and fall migration.
- disturbance of nesting and molting birds by aircraft or construction activities.
- alterations of water levels in wetland breeding areas.
- increased hunting and harassment of birds owing to improved access created by pipeline access roads, airfields and the Mackenzie and Dempster Highways.
- oil and chemical spills in important habitats for birds.
- destruction of habitat and food supplies by fire.

Disturbance of Waterfowl During Spring Migration

During May, hundreds of thousands of migrating waterfowl, especially whistling swans, snow geese and white-fronted geese, utilize the stretch of Mackenzie River and its islands, from Norman Wells to Arctic Red River, for feeding, nesting and mating. As waterfowl move northward, following spring thaw, they feed heavily on aquatic plants, the roots of horsetail and other plants growing on the mud bars, and willow catkins. Part of the energy required for egg production may be accumulated at this time. Aircraft, as far as one mile from the birds and 1800 feet above them, cause disturbance. It may take up to one-half hour before they settle down again. Such disturbance may reduce energy intake or feeding time and interfere with mating to the extent that reproduction is reduced.

Since disturbance may interrupt feeding and mating activities of waterfowl, especially snow geese (most of the western Arctic populations are represented here), we suggest that the pipeline should be as far from the river as possible and that aircraft use be minimized in May, especially with respect to airlifts of construction materials. Aircraft should also fly at altitudes of no less than 1000 feet over these islands. Since the islands provide food for migrating ducks, geese and swans and also afford some protection from predators, no physical alteration of these islands, especially the "borrowing" of substrate materials for construction activities, should be permitted. Special care must be taken with the unloading and storage of petroleum products to ensure that they do not get into the water or on river ice.

Disturbance of Snow Geese During Fall Migration

From late August through September, and sometimes early October, thousands of snow geese move southwest from their breeding colonies on Banks Island, Kendall Island and the Anderson River delta, to the foothills and the coastal plain from Alaska to the Mackenzie Delta. They feed heavily on blueberries, cranberries and the like during daylight hours and return to the coast at night to sleep. These staging/feeding areas allow geese to accumulate energy reserves, in the form of fat deposits, for their non-stop, southward flight to Alberta and Saskatchewan. Disturbance at this time interrupts feeding activities and may result in insufficient energy reserves during fall migration.

We suggest that no construction, airlifts or unnecessary disturbance occur along the entire coastal plain from mid-August through early October. Aircraft should fly no less than 1000 feet over this area.

Disturbance to Nesting Birds by Aircraft and Construction Activities

Waterbirds and birds of prey are known to breed in significant numbers in such western Arctic areas as Northern Yukon/Delta Coast (coastal plain), northwest Mackenzie Delta, barrier beaches and offshore islands, Old Crow Flats, Campbell Lake, The Ramparts and northeastern Richardson Mountains. Aircraft and human disturbance can result in nest abandonment, egg losses to predators, egg chilling and effect reproduction over a period of time.

Winter construction (November through March) would eliminate most direct conflicts between construction activities and breeding birds. Airlifts into known important nesting areas as well as overflights should be avoided from April through July for birds of prey and in June and July for waterbirds. Observing specified altitudinal limits may reduce the disturbance but the data required for setting such limits are not currently available. Staging and storage areas for pipeline supplies should avoid known nesting areas such as barrier beaches coastal lagoons. The physical alteration of habitat, such as removal of gravels from cliff and island areas, should be discouraged.

Alterations of Water Level in Wetland Breeding Areas

The wetland areas such as Mackenzie Delta, Old Crow Flats, Ramparts River Flats and Yukon coastal plain are the breeding habitats of waterfowl and shore birds of many species. They are also used as summering areas for prairie ducks displaced by drought. The maintenance of the water level and water quality in these areas determines their attractiveness to the birds.

It is probable that the obstruction or re-direction of ground water or small streams maintaining wetlands by a pipeline laid across the flow will affect water levels or quality in such a way that waterfowl populations will be reduced.

It is imperative that wetland areas down slope from the pipeline right-of-way continue to receive their normal supply of water.

Increased Hunting and Harassment of Birds From Access Roads

The types of disturbance and habitat alteration resulting from pipeline construction, will also occur at a greater rate as access to the area is increased by public highways, air strips and pipeline access roads. Some of the bird species of the region which are rare, endangered or spectacular, such as falcons, cranes, and swans as well as huge flocks of waterfowl, will attract the interests of tourists and hunters. Several instances are already known of tourist disturbance causing the abandonment of raptor nests.

No hunting or public access should be allowed on the pipeline right-of-way or roads. The routing of the Dempster and Mackenzie highways should take known waterfowl concentrations and raptor nesting areas into consideration. Territorial governments may have to consider new hunting regulations if access is greatly increased.

Oil and Chemical Spills

Accidental oil and chemical spills from well blowouts, pipeline breaks, faulty storage facilities and human carelessness can be disastrous to populations of birds, especially molting sea ducks, colonial nesters, local bird staging areas during spring and fall migration and to fish-eating birds (loons, etc.). These spills, usually costly to clean up, are of great public concern and cause spectacular short-term environmental problems. Unknown are the long-term effects of low-level petroleum pollution. The garadual and continual seepage of oil and chemical pollutants from drilling and construction activities, vehicular traffic, etc., can alter the environment in subtle ways which affect bird populations.

Some long-term effects of pesticides on avian survival and productions are known. The persistent chlorinated hydrocarbons in particular have been linked to reproductive failure in birds at the end of food chains.

The Environment Protection Board to date has considered only the environmental effects of a natural gas pipeline. If an oil pipeline were to be considered in a corridor with the gas line, then major new routing and construction criteria must be considered to reduce the possibility of large quantities of oil entering major waterbird habitats.

The specifications for the transport, unloading, storage and disposal of petroleum products and toxic chemicals to be used in the project must be examined carefully to insure that they do not enter water bodies used by birds. Pesticides should not be used on this project.

Fire

Fire initially reduces the density of nesting birds in both forest and tundra habitats by denuding areas of vegetation which provides hiding places for them and their nests, food in the form of berries, buds or shoots and cover and food for their prey species such as small mammals or insects. Fire may also alter the hydrologic regime of water bodies, thus changing their suitability for nesting or feeding. The recovery rate of bird habitat following fire in different regions of the pipeline route is not known.

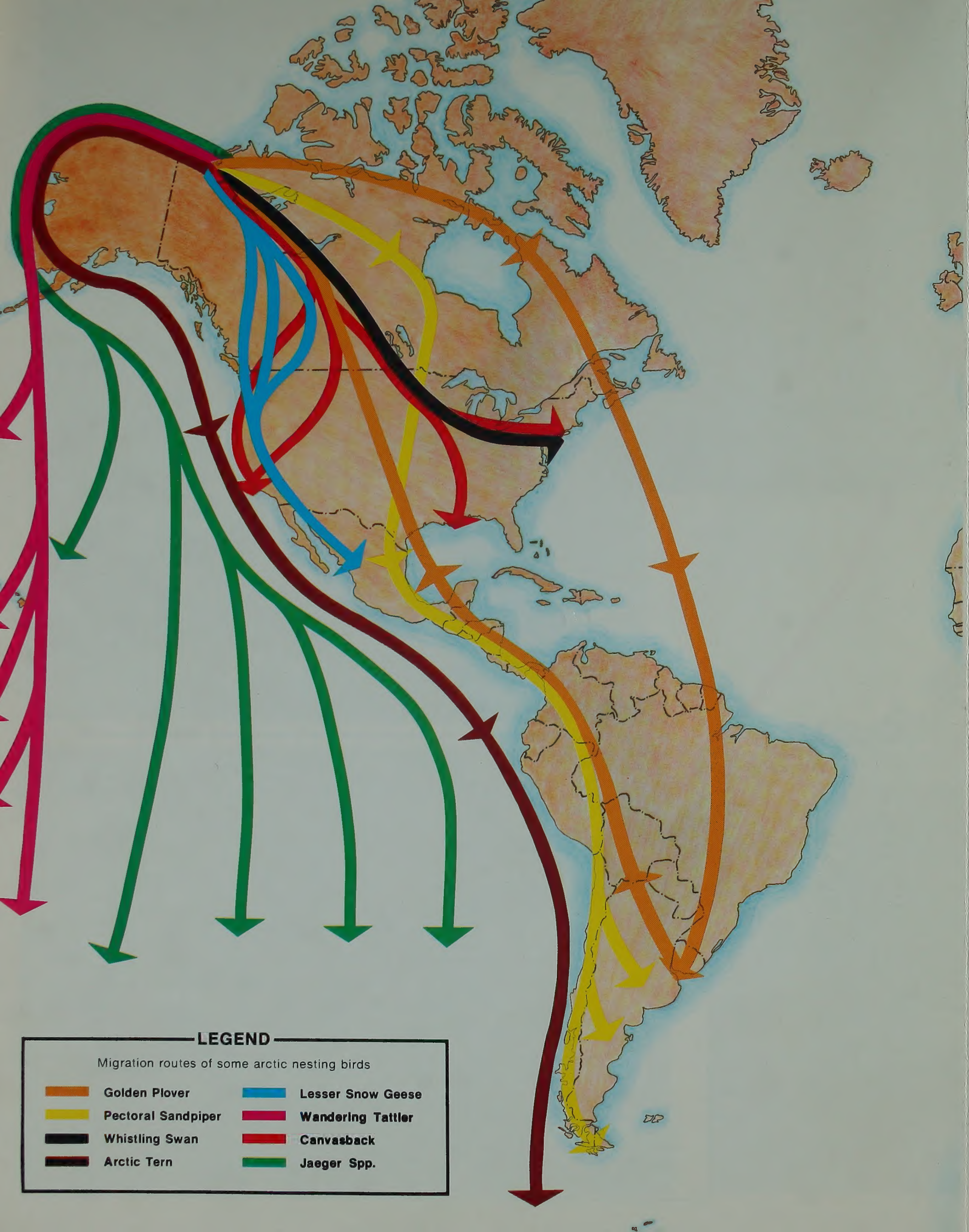
Fire has a variety of deleterious effects on birds as well as other wildlife species. We have recommended a variety of preventive and control measures which should reduce the occurrence of and damage done by fires during construction and operation.

Summary

The limitation of construction and aircraft operation to the months November through April would be the most significant step towards reducing conflicts between construction and bird populations. If operations cannot be restricted to these months then studies of the tolerance of nesting, migrating and molting birds to various types of disturbance must be carried out. These studies are currently underway by CAGSL consultants.

Habitat alterations, including fire, substrate borrowing and alteration of water levels would be destructive in certain areas. The careful handling of all petroleum products and toxic chemicals is imperative and specifications for their control must be evaluated before the initiation of the project. The inclusion of an oil pipeline with the gas pipeline would raise many issues which have not yet been considered for this project.

A good start has been made towards collecting baseline data which will allow a post-construction evaluation of impact but more years of data and the inclusion of other areas in the study are required.



The ptarmigan, a member of the grouse family, changes color with the seasons like the snowshoe hare. In winter the birds turn pure white except for their black eyes and beak. They often flock together by the hundreds in the Mackenzie River Delta and in river valleys in the mountains, where they feed on willow buds during the short daylight hours and sleep under the soft snow at night. In summer the well-camouflaged birds disperse widely over the tundra to nest.

G. Calef

The snow bunting is one of the earliest and most abundant migrants through the northern Yukon, but most birds continue on to the Arctic islands to nest. However, some nests were located in the foothills of the Romanzof mountains, and in abandoned structures on the Beaufort Sea coast.

G. Calef

The white crowned sparrow is one of the most abundant birds in the north-western boreal forest. A massive spring migration of these and other seed eating birds occurs just after snow melt, the period at which seed would be sowed to revegetate a pipeline right-of-way.

W. Campbell

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A brood of newly hatched scoters on the Ramparts River Flats. Scoters and scaup were the most abundant waterfowl species observed on aerial census of northern breeding areas and together accounted for 50-60% of the ducks observed.

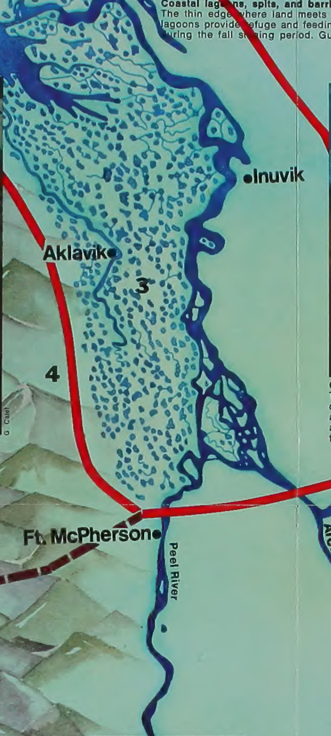
G. Calef

A male mallard duck. In years of drought millions of ducks including mallards, pintails and widgeon, leave the dry prairies for arctic wetlands.

G. Calef

The lesser yellowlegs is one of the commonest shorebirds nesting on wetlands within the boreal forest.

G. Calef



I. Reinart

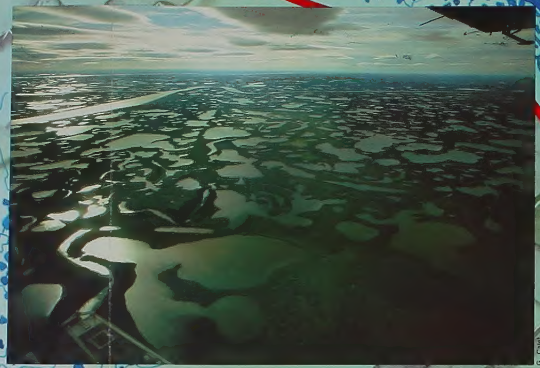
Coastal lagoons, spits, and barrier beaches
The thin edge where land meets sea is the most restricted of the bird habitats in the western Arctic. The lagoons provide refuge and feeding areas for molting waterfowl and sea birds, and resting places for geese during the fall staging period. Gulls, terns and sea ducks nest on the spits and beaches.

An arctic tern on her nest. These birds nest in wetlands throughout the North and also use the barrier beaches, spits and offshore islands.

W. Campbell

Both king and common eiders (shown here) nest on sand spits and offshore islands along the Alaska and Yukon coasts. In spring hundreds of thousands of these birds and others such as old squaw migrate around Point Barrow, Alaska and then east following leads in the sea ice.

W. Campbell



G. Calef

Wetlands
Northern wetlands provide large areas of nesting habitat for waterfowl. The largest and best known wetlands near the proposed pipeline routes are the Mackenzie Delta, Old Crow Flats and Ramparts River Flats but many other smaller areas also exist. All phases of the pipeline project must be examined to insure that they will not disturb these habitats or alter their hydrologic regime.

G. Calef

Coastal tundra
This low, flat, wet coastal plain between the mountain foothills and the ocean beaches has the greatest diversity of breeding birds. Shorebirds of many species, ptarmigan, jaegers, owls and longspurs nest in the cottongrass and other sedge areas. Swans, loons, ducks, and gulls utilize the lakes and small ponds. Willows and alders along stream courses provide habitat for small passerine birds, [illegible] the tundra provides forage for huge flocks of geese prior to [illegible]

This female ptarmigan on her nest is virtually invisible from six feet away. Both willow and rock ptarmigan nest widely throughout the tundra regions. Many biologists believe that ptarmigan experience population cycles similar to those of the lemming and snowshoe hare.

G. Calef

The long-tailed jaeger is primarily a sea bird wintering in the open ocean of both the Atlantic and Pacific, but it returns to the arctic tundra to nest. All three species of jaeger, the long-tailed, pomarine, and parasitic, occur in the western Arctic. They are especially abundant in years of high lemming and ptarmigan populations. Jaegers often rob the nests of other birds.

G. Calef

Most of the western Arctic population of snow geese migrates along the Mackenzie River enroute to nesting grounds.

Geese first reached the Norman Wells area about May 7 in 1972 where they concentrated on mud bars on the river islands. By May 25 over 92,000 geese were on the river, mostly in the Little Chicago area.

W. Campbell

B. Davies

A half-grown peregrine falcon chick at a nest in the Richardson Mountains screams at a biologist who is about to band it.

In ten nests examined in 1972 biologists found an average of 2.4 young per successful nest, an excellent reproductive rate, indicating that this species is still breeding successfully in the western Arctic. Active nest sites were observed in the Richardson Mountains, east side of the Mackenzie Delta and on cliffs along major rivers.

W. Campbell

Mackenzie River islands
These islands between Norman Wells and Point Separation provide the major concentration areas for migrating waterfowl and other birds in spring. Here resting, feeding and copulation occur. The first open water of spring occurs near the islands.

W. Campbell

The nesting season in the Arctic is so short, that many species of birds must arrive on the nesting grounds ready for egg laying — there is no time for courtship and copulation after arrival. Thus these activities occur during migration. These Canada geese and their relatives the snow geese require open water for copulation, which they find on the margins of islands in the Mackenzie River. Disturbance of the birds must be avoided at this critical stage of the life cycle.

Richard Fyfe-Canadian Wildlife Service

Golden eagles, largest of the world's birds of prey, nest abundantly in the mountains and foothills of the northern Yukon. Twenty-one occupied nests and 35 unoccupied nests were located in 1972. Golden eagles are the most sensitive to disturbance of all raptors.

Richard Fyfe-Canadian Wildlife Service

This graceful predator, the peregrine falcon, is considered a rare and endangered species by many wildlife agencies and has vanished from much of its former range in North America. The Arctic sub-species seems to be holding its own. Studies by biologists at one location indicated a nesting frequency of 0.8 pairs/linear mile of lake shoreline (as high as any ever recorded for this species). Undisturbed northern nesting areas are vital for the survival of the peregrine falcon.

G. Calef

Cliffs and cut-banks
This cliff along a river in the northern Richardson Mountains is typical of the sites chosen for nesting by falcons, hawks and eagles. Many of the sites are traditional, used by a bird or its offspring for many years. The surrounding areas are rich in ptarmigan, ground squirrels, and small birds which constitute the prey of these raptors. Most of these raptors are susceptible to disturbance during the nesting period.

W. Campbell

The Whistling Swan, one of North America's largest waterfowl. Over 20,000 of these birds nest in the Mackenzie Delta and northern Yukon coast. They migrate north mostly along the Mackenzie River where they utilize the same islands as the geese.

LEGEND

The Five Critical Habitats for Western Arctic and Sub-Arctic Birds

1. Coastal lagoons, spits and barrier beaches
2. Coastal tundra
3. Wetlands
4. Cliffs and cutbacks
5. Mackenzie River islands

PRIME ROUTE 🟥

ALTERNATE ROUTE ▬ ▬ ▬

This map shows the location of, and a typical scene from, the five types of habitat considered critical for birds in the western Arctic. Each habitat and its bird populations is considered susceptible to certain types of destruction or disturbance. The ornithological research undertaken by the Environment Protection Board and consultants to CAGSL has been designed to find out when and how birds use these habitats, what human activities would be detrimental to them, and how to avoid conflicts between birds and the pipeline project.

Cover Photo — W. Campbell

Environment Protection Board

In 1970 the Environment Protection Board began studying effects on the natural environment of construction and operation of a natural gas pipeline through the Yukon and Northwest Territories. The study involves collecting baseline data, incorporating environmental planning into pipeline design, assessing impact, preparing guidelines for education and control of construction personnel and evaluating post-construction activities. The Board, now sponsored by Canadian Arctic Gas Study Limited, is composed of specialists in Arctic research or environmental science.

The Board, an autonomous body, is guided by the following objectives:

1) To become sufficiently familiar with arctic ecosystems in the area of pipeline operation to permit estimates of biological costs or benefits of construction and judgments about the potential for widespread damage or major disruption of ecosystems.

2) To become sufficiently familiar with biological and physical environments so that pre-construction findings can be used as a basis for post-construction evaluation.

3) To make recommendations and conduct briefings so that results of the Board's deliberations can be used for maximum environmental protection.

4) To make available results of its studies as a direct contribution toward northern scientific development.

The Board's deliberations are to continue throughout the life of the proposed four-year construction project and for a suitable period during the operational phase.

Members of the Environment Protection Board are: Mr. C.H. Templeton (Chairman), Dr. L.C. Bliss, Dr. M.E. Britton, Mr. D.W. Craik, Mr. E. Gourdeau, Dr. I. McTaggart-Cowan, Dr. S. Thomson, Dr. N.J. Wilimovsky and Mr. R.C. Isaak (Secretary).

Outside specialists are used for specific assignments. Administrative support for the Board is supplied by Interdisciplinary Systems Ltd., 528 St. James Street, Winnipeg, Manitoba.

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